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van Lange, P.A.M.; van Vugt, M.; Meertens, R.M.; Ruiter, R.

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A Social Dilemma Analysis of Commuting Preferences: The Roles of Social Value Orientation and Trust[1]

PAUL A. M. VAN LANGE[2]
Department of Social Psychology
Free University at Amsterdam
The Netherlands

MARK VAN VUGT
University of Southampton
England

REE M. MEERTENS AND ROB A. C. RUITER
University of Maastricht, The Netherlands

The current research advances a social dilemma analysis of commuting, examining the roles of preexisting personality differences in social value orientation (i.e., prosocial vs. proself orientation) and trust (i.e., a general belief in the honesty and cooperative intentions of others) in determining preferences for collectively desirable commuting options: preferences for commuting by public transportation (Study 1) and carpooling (Study 2). Consistent with predictions, both studies revealed that, relative to preferences of prosocials, preferences of proselfs were more strongly associated with beliefs about the relative efficiency of cars (i.e., an outcome affecting personal well-being). Also, greater preferences for collectively desirable actions were observed among prosocials with high trust—relative to prosocials with low trust and proselfs with high or low trust—providing support for the claim that 2 conditions (i.e., prosocial goals *and* trust in others) must be met to obtain collectively desirable commuting preferences.

One of the most critical problems of contemporary society derives from the unfortunate fact that many behaviors that tend to serve our personal well-being are detrimental to the environment. For example, environmental experts have estimated that pollution levels could be considerably decreased if more people would commute by public transportation or carpool rather than individually commuting by car (cf. Lowe, 1990; Stern, 1992). Despite such detrimental effects, individual car use is typically preferred by most people because of its flexibility, convenience, and privacy. How, then, can individuals be motivated to commute by public transportation or carpooling? To what extent are individuals'

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[2]Correspondence concerning this article should be addressed to Paul Van Lange, Department of Social Psychology, Free University at Amsterdam, Van der Boechorststraat 1, NL-1081 BT Amsterdam, The Netherlands. e-mail: pam.van.lange@psy.vu.nl.

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considerations underlying commuting preferences based on concern with personal well-being and based on concern with collective well-being?

The current research advances a social dilemma analysis of collectively desirable preferences (i.e., commuting by public transportation or carpooling rather than individually by car), proposing that such preferences can be enhanced by considerations of personal well-being (i.e., the extent to which such means of transportation are believed to be efficient, relative to commuting alone by car) as well as considerations of collective well-being (i.e., the extent to which such means of transportation are believed to be more environmentally friendly, relative to commuting alone by car). The major purpose of this research is to examine whether differences in social value orientation (i.e., preferences for particular patterns of outcomes for self and others; cf. Messick & McClintock, 1968) are reflected in the extent to which considerations of personal well-being and considerations of collective well-being underlie preferences for public transportation and carpooling. Moreover, we examine whether social value orientation in combination with personality differences in trust (i.e., a general belief in the honesty and cooperative intentions of others; Yamagishi, 1988) contributes to the predictive ability of either personality construct alone in determining preferences for public transportation and carpooling.

A Social Dilemma Analysis of Commuting Preferences

A *social dilemma* is defined as a situation in which (a) behaving in a collectively undesirable manner (i.e., the noncooperative option) yields better personal outcomes than behaving in a collectively desirable manner (i.e., the cooperative option), irrespective of others' choices; (b) yet, if most or all people choose the noncooperative option, the outcomes for all individuals involved are worse than if all or most people choose the cooperative option (cf. Hamburger, 1979; Messick & Brewer, 1983; Van Lange & Messick, 1996). Commuting by car versus commuting by public transportation or carpooling represents a social dilemma, in that commuting by car typically yields better outcomes for individuals, whereas commuting by public transportation and carpooling are less polluting and therefore collectively more desirable.[3]

[3]We assume that the choice between commuting by car versus commuting by public transportation or carpooling shares important features of a social dilemma, in that for many individuals, commuting by car tends to promote personal well-being, and the collective consequences of commuting by car are more harmful than the collective consequences of commuting by public transportation or carpooling (for evidence, see Van Vugt, Meertens, & Van Lange, 1995). However, we do not assume that all individuals involved are actually faced with a social dilemma. For example, some individuals might prefer public transportation for reasons (*footnote 3 is continued on page 798*)

An important inspiration to research on large-scale social dilemmas derives from major challenges to societal well-being, in particular shortage of important resources such as energy or water. Although social dilemmas as they occur in the real world increasingly capture the attention of social and behavioral scientists (e.g., Ostrom, 1990; Plous, 1985; Samuelson, 1990), the extant literature on social dilemmas is predominantly based on the results of small-scale laboratory studies (for recent overviews, see Komorita & Parks, 1994; Van Lange & Messick, 1996). Accordingly, it is important to examine whether and how theories and insights based on this literature help us to understand the psychological factors underlying preferences in this important social dilemma in the real world.

Prior research has revealed that there are at least two distinct motivational processes underlying cooperation in social dilemmas. First, behavior in social dilemmas is importantly affected by a concern with own personal well-being. Indeed, prior research on social dilemmas has demonstrated that cooperation is importantly enhanced to the extent that such actions are believed to be less costly (or more beneficial) to self (e.g., Komorita, Sweeney, & Kravitz, 1980). Also, field research has revealed similar findings. For example, Winett and Nietzel (1975) have shown that monetary reward for energy saving can be an effective means to promote conservation, yielding a 10 to 30% drop (and sometimes up to 40%) in energy use.

Second, cooperation can be enhanced by a concern with collective well-being. A consistent finding across several studies is that cooperation is enhanced to the extent that personally costly behaviors are believed to make a greater contribution to collective well-being (e.g., Kelley & Grzelak, 1972; Kerr, 1989). Also, field research has suggested similar patterns, in that donations and volunteering are more likely, to the extent that such behaviors are believed to make a greater contribution to collective well-being (for a review, see Schroeder, Penner, Dovidio, & Piliavin, 1995).

The Role of Social Value Orientation

We assume that different people approach social dilemmas in fundamentally different ways, proposing that some individuals tend to view such situations in terms of their personal well-being, whereas others tend to view such situations in terms of collective well-being. Such different approaches, at least

(*Footnote 3 continued*) unrelated to considerations of collective well-being (e.g., "I hate driving"). Moreover, it is possible that individuals construe the situation as an interdependence situation quite different from a social dilemma. For example, those primarily concerned with efficiency and convenience might develop preferences of choosing those options that others do not choose so as to avoid traffic jams or crowded trains (cf. Joireman, Van Lange, Kuhlman, Van Vugt, & Shelley, 1997).

in part, reflect personality differences in social value orientation, defined as preferences for particular patterns of outcomes to self and others (McClintock, 1972). Although a variety of social value orientations can be identified, in the current research we focus on individuals with prosocial orientations (i.e., maximizing outcomes for self and others, and minimizing differences between these outcomes) and those with proself orientations, who tend to maximize outcomes for self, either in an absolute sense (i.e., individualists) or in a relative sense (i.e., competitors, who prefer relative advantage over others' outcomes; cf. Kuhlman & Marshello, 1975; McClintock & Liebrand, 1988; Parks, 1994; Van Lange & Kuhlman, 1994).

Over the past 2 decades, numerous studies have revealed that these social value orientations are related to behavior in experimentally created social dilemmas, with prosocials exhibiting greater cooperation and exercising greater restraint than individualists or competitors (cf. Kramer, McClintock, & Messick, 1986; Liebrand, Wilke, Vogel, & Wolters, 1986; Parks, 1994; Samuelson, 1993; Van Lange & Liebrand, 1991). Although prior work has validated the concept of social value orientation primarily in the context of experimental games, there is increasing evidence for its ecological validity, demonstrating links between social value orientation and motivations or behaviors in various interdependence situations, including helping situations, negotiation situations, and close relationships (e.g., De Dreu & Van Lange, 1995; McClintock & Allison, 1989; Van Lange, Agnew, Harinck, & Steemers, 1997).

How might social value orientation affect individuals' willingness to engage in collectively desirable actions, such as commuting by public transportation or carpooling? We propose that the considerations relevant to collective well-being and those relevant to personal well-being are differentially important to individuals with prosocial versus proself orientations. Proselfs, who are inclined to evaluate interdependence situations in terms of their personal well-being, should be particularly responsive to actual or perceived variations in outcomes relevant to their own personal well-being. That is, commuting preferences by proselfs should be strongly determined by the extent to which the available options differ in consequences for their personal well-being. In contrast, prosocials who are inclined to evaluate interdependence situations in terms of collective well-being, should be relatively more responsive to actual or perceived variations in outcomes relevant to collective well-being. That is, commuting preferences by prosocials should be strongly determined by the extent to which the available options differ in consequences for collective well-being. Congruent with these lines of reasoning, a recent study by Van Vugt et al. (1995) revealed that prosocials tend to develop greater preferences for commuting by public transportation when they believe that the majority of others commute by public transportation, providing some (indirect) support for the

claim that considerations of collective well-being (i.e., a healthy environment) are particularly important to prosocials. Conversely, proselfs tend to develop greater preferences for commuting by car when they believe that the majority of others commute by public transportation, suggesting that they prefer travel options that others do not choose in order to avoid congested highways or train stations (i.e., considerations of personal well-being).

As suggested by Van Vugt et al.'s (1995) research, an important outcome determining personal well-being is *travel efficiency*, the average travel time of a particular journey; and an important outcome determining collective well-being is the contribution to levels of local and global environmental pollution (e.g., Joireman et al., 1997). Accordingly, we advanced the following hypotheses. First, we predicted that collectively desirable commuting preferences are enhanced to the extent that commuting by car is believed to be relatively less efficient (Hypothesis 1a). Second, we predicted that collectively desirable commuting preferences are enhanced to the extent that commuting by car is believed to bring about lower costs to the environment (Hypothesis 2a). Of greater importance, we predicted that each of these beliefs interacts with social value orientation to determine commuting preferences. First, relative to prosocials, proselfs should be particularly responsive to variations in the degree to which commuting options are believed to have consequences for efficiency (i.e., an outcome relevant to personal well-being); thus, we expected the relationship between perceived efficiency and preferences for collectively desirable commuting options to be more pronounced for proselfs than for prosocials (Hypothesis 1b). Second, relative to proselfs, prosocials should be particularly responsive to variations in the degree to which commuting options are believed to differ in their consequences for the environment (i.e., an outcome relevant to collective well-being); thus, we expected the relationship between perceived pollution of the environment and preferences for collectively desirable commuting options to be more pronounced for prosocials than for proselfs (Hypothesis 2b).

Social Value Orientation and Trust

Prior research has revealed that, all else being equal, prosocials are somewhat more prone to exhibit preferences for public transportation than are individualists and competitors (Van Vugt et al., 1995; Van Vugt, Van Lange, & Meertens, 1996). However, such differences have not been consistently observed (Joireman et al., 1997), suggesting that social value orientation is unlikely to be the only disposition-based determinant of commuting preferences. What other factors may be relevant to understanding cooperation in large-scale social dilemmas? In their goal/expectation theory, Pruitt and Kimmel (1977)

state "the goal of achieving mutual cooperation is insufficient to elicit cooperative behavior. It must be accompanied by *an expectation that the other will cooperate* [italics added]" (p. 375). A social disposition relevant to understanding such expectations is the level of trust people have in others' willingness to cooperate (Yamagishi, 1988; see also Deutsch, 1958; Edney, 1980).

Could it be that the combination of social value orientation and trust more fully accounts for cooperation in real-life social dilemmas than does either variable alone? And are these two dispositions sufficiently independent that it is meaningful to combine these two dispositions? As to the latter question, theoretical models underlying the social value orientation concept focus on the weights individuals assign to outcomes for self and others (cf. McClintock, 1972; Wyer, 1969). These models do not include a component relevant to beliefs regarding the cooperativeness or competitiveness of others. Although a link between social value orientation and trust may be intuitively compelling, the extant literature reveals that the relationship between these two concepts is weak or virtually absent. Indeed, recent work indicates that prosocials and proselfs do not significantly differ in terms of trust as measured by Yamagishi's (1988) instrument (Joireman et al., 1997; Parks, 1994; for an exception, see Kuhlman, Camac, & Cunha, 1986, who describe a study which revealed that competitors exhibited lower trust, relative to prosocials and individualists). Thus, there is good reason to believe that the concepts of social value orientation and trust are quite independent, thereby providing a basis for focusing on four distinct categories of values and trust: (a) prosocials with high trust, (b) prosocials with low trust, (c) proselfs with high trust, and (d) proselfs with low trust.

How might social value orientation and trust interact to determine cooperation in large-scale social dilemmas? Both Pruitt and Kimmel's (1977) goal/expectation theory and Yamagishi's (1986) structural goal/expectation theory (which, among other things, extends the goal/expectation theory to large-scale social dilemmas) indicate that two conditions must be met to obtain cooperation. First, an individual needs to be motivated to enhance collective well-being (i.e., an individual must be willing to pursue cooperative goals). Second, an individual needs to believe that others are likely to pursue similar goals (thus expecting others to exhibit cooperation) so that the goal of mutual or collective cooperation can actually be accomplished.

This logic implies that individuals who expect others to make proenvironmental decisions (i.e., those with high trust) will also make proenvironmental decisions as long as such individuals are concerned with collective outcomes (i.e., if they hold a prosocial orientation). In contrast, individuals with high trust are unlikely to hold proenvironmental preferences if such individuals primarily tend to consider outcomes for self (i.e., hold a proself orientation). What about individuals with a prosocial orientation but low levels of trust? Such individuals

should generally be predisposed to make proenvironmental decisions but are pessimistic regarding others' willingness to cooperate. Thus, even though they are concerned with enhancing collective well-being, they seriously doubt whether the goal of mutual or collective cooperation can actually be accomplished. Two more specific reasons may further explain why such individuals are unlikely to cooperate. First, these individuals are likely to believe that their contribution will make little difference if others fail to contribute (cf. perceived efficacy; Kerr, 1989). Second, they may also feel like "suckers" being the only ones contributing to a healthy environment, and therefore not exhibit cooperation.

Thus, on the basis of the logic underlying the goal/expectation theory (Pruitt & Kimmel, 1977) and extensions thereof to large-scale social dilemmas (Yamagishi, 1986), we hypothesized that an individual is likely to exhibit cooperation when (a) he or she is motivated to enhance collective well-being, and (b) he or she believes that others are likely to exhibit cooperation. Accordingly, we predicted an interaction of social value orientation and trust, such that individuals with prosocial value orientations and high levels of trust exhibit stronger preferences for collectively desirable commuting options than prosocials with low trust, proselfs with high trust, or proselfs with low trust (Hypothesis 3).

Of lesser relevance, we advanced two hypotheses predicting main effects for social value orientation and trust. First, consistent with some (but not all) past research, we predicted a main effect for social value orientation, with prosocials exhibiting greater preferences for collectively desirable commuting options, relative to proselfs (Hypothesis 4a). Second, past research has revealed some evidence indicating that individuals with high trust are more likely to exercise restraint in so-called resource dilemmas and make investments in so-called public good dilemmas than are individuals with low trust (e.g., Brann & Foddy, 1987; Joireman et al., 1997; Messick et al., 1983; Parks, 1994; Yamagishi, 1988, 1992). Accordingly, we hypothesized a main effect for trust, predicting that individuals with high trust would exhibit greater preferences for collectively desirable commuting options, relative to individuals with low trust (Hypothesis 4b).

Study 1

Study 1 focuses on preferences for commuting with public transportation, and employs a hypothetical commuting situation to obtain preliminary evidence relevant to the predicted effects of social value orientation in relation to (a) beliefs regarding the relative efficiency of car (i.e., Hypotheses 1a and 1b) and (b) beliefs regarding the degree of pollution due to car use (i.e., Hypotheses 2a and 2b). Moreover, Study 1 tests the predicted effects involving social value orientation and trust (i.e., Hypotheses 3, 4a, and 4b).

Method

Participants and design. One hundred forty daily commuters in the Netherlands participated in the current study. Among these were 105 males and 34 females (one commuter failed to indicate gender) with an average age of 36.5 years (minimum and maximum age 19 and 62 years, respectively). The participants were individuals commuting by car on a daily (52%) or regular basis (48%)—the latter group occasionally commuted by bike, train, or bus. The hypotheses of this study were tested in a 2 × 2 × 2 × 2 (Social Value Orientation: Prosocial vs. Proself Orientation × Trust: Low vs. High × Efficiency of Car: Low vs. High × Pollution of Car: Low vs. High) factorial design.

Procedure. As in previous research (e.g., Joireman et al., 1997; Van Vugt et al., 1996), participants were recruited at gas stations. Questionnaires were distributed in a large industrialized area in the Netherlands (near the city of Den Bosch) during morning and evening rush-hour traffic. We did not focus on particular groups of participants, but approached all commuters who stopped at this gas station (i.e., all commuters who indicated that they were commuting between home and work were asked whether they would be interested in completing a questionnaire about commuting). Most commuters were employees of companies located in that particular business district. The first page of the questionnaire explained that the responses were anonymous and that participants could complete this questionnaire at their own "leisure" (i.e., a self-paced procedure). The remainder of the questionnaire employed a fixed order in which the different constructs were assessed (i.e., social value orientation, trust, and commuting preferences). After they had expressed their willingness to participate in the research, participants received a stamped, self-addressed return envelope and a survey, which they could complete either at work or at home. Out of a total of 300 questionnaires we distributed, 140 were returned (47% response rate). Those who returned their surveys received a letter of thanks, including a debriefing form and two small gifts (i.e., a map of the Netherlands and a letter opener).

Personality questionnaires. The first part of the questionnaire assessed social value orientation and trust. The questionnaire included a series of nine decomposed games (e.g., Kuhlman & Marshello, 1975; Messick & McClintock, 1968) to assess an individual's social value orientation. As in most research on social value orientation, we administered decomposed games in which participants were given a choice among three options, each corresponding to one of the three social value orientations under study.

An example of a decomposed game is the choice between Option A, 4.80 fl for self and 4.80 fl for other; Option B, 5.40 fl for self and 2.80 fl for other; and Option C, 4.80 fl for self and 0.80 fl for other (one Dutch guilder equals

approximately $0.65 in American currency). Option A represents the prosocial option, because the sum of outcomes for self and other (4.80 + 4.80 = 9.60) is larger than for Option B (5.40 + 2.80 = 8.20) or Option C (4.80 + 0.80 = 5.60), and because Option A provides a smaller discrepancy between own and other's outcomes (4.80 - 4.80 = 0) than does either Option B (5.40 - 2.80 = 2.60) or Option C (4.80 - 0.80 = 4.00). Option B represents the individualistic option because the outcome for self (5.40) is larger than for either Option A (4.80) or Option C (4.80). Finally, Option C represents the competitive option because the difference between the outcome for self and other (4.80 - 0.80 = 4.00) is larger than for Option A (4.80 - 4.80 = 0) or Option B (5.40 - 2.80 = 2.60). The decomposed game measurement technique has been demonstrated to have good internal consistency and test–retest reliability over substantial periods of time. Also, it is worth noting that social value orientation is not related to measures of social desirability or indexes of mood (e.g., Kuhlman et al., 1986; Liebrand & Van Run, 1985; Van Lange & Liebrand, 1991; Van Lange, Otten, De Bruin, & Joireman, 1997).

Individuals were classified as either prosocials, individualists, or competitors if at least six of nine decisions were consistent with a particular value orientation (cf. McClintock & Allison, 1989; Van Lange & Kuhlman, 1994). Using these criteria, 95 were classified as prosocial (68%), 33 as individualists (24%), 4 as competitors (3%), and 8 commuters (6%) made fewer than six consistent choices and hence were not classified. As in some prior research on social value orientation, we combined the individualists and competitors to form a group of basically self-interested or proself individuals (cf. Kramer et al., 1986; Van Lange & Liebrand, 1991; Van Vugt et al., 1995).

Next, we assessed levels of general trust in others' cooperation, using a list of five items adopted from prior research (e.g., Yamagishi, 1988, 1992). In the present study, the scale included the following items: (a) Nowadays you have to be careful, otherwise people will exploit you; (b) If there were fewer policemen, it would be much more dangerous on the streets; (c) One should not trust other people, unless one knows them well; (d) Many things in life often fail, because a lot of people pursue their self-interests; and (e) You have to be careful with strangers, until you know you can trust them. For each of these items, we assessed level of agreement/disagreement, 1 (*very strongly disagree*) to 7 (*very strongly agree*). This scale exhibited reasonably good internal consistency ($\alpha = .70$).

Level of trust was measured by averaging the scores on these five items, so that a high average score reflects low trust and a low average score reflects high trust. As in prior research (e.g., Joireman et al., 1997; Yamagishi, 1988), we classified participants through a median split to distinguish between individuals with low trust (with an average score greater than 4.70) and individuals with high trust (with an average score less than 4.70). Finally, as in some prior

research (Joireman et al., 1997; Parks, 1994), the distributions of prosocials and proselfs were not significantly different among individuals with high trust (respective percentages were 74.2% and 25.8%) and individuals with low trust (69.7% vs. 30.3%), $\chi^2(1, N = 132) = 1$, *ns*.

The commuting situation. The second part of the survey contained a description of a hypothetical commuting situation, a description that was said to depict a possible scenario that might be quite realistic 10 years from now (for a similar procedure, see Van Vugt et al., 1995). Participants were asked to imagine that they were employees of a fairly large company ("Comptel"), which employs about 2,000 individuals who commute to work on a daily basis. The distance between home and the company was said to be 40 km (approximately 25 miles), which could be covered either by car or public transportation (i.e., train). There was a highway and a railway (including a railway station) very near to their house, both leading directly to the industrial area where Comptel was located. Before commuters made their decisions to commute by car or by public transportation, it was explicitly stated that all 2,000 employees (a) were commuting in the morning rush hour, (b) had access to both types of transportation, and (c) used the same highway or railway route. Thereafter, they received information about the presumed effects of their and others' commuting decisions on the levels of traffic congestion and environmental pollution.

Beliefs about efficiency. It was explained that under normal circumstances, commuting by car would be more efficient than public transportation in terms of average travel time (respective travel times were 40 vs. 50 min). However, unlike the travel time of commuting by train, the travel time of commuting by car could increase substantially as a consequence of traffic congestion on the route. In the *high car efficiency* condition, it was stated that the amount of traffic jams had been reduced considerably over the past decade. Accordingly, it was very unlikely that people would end up in a traffic jam; so, it would be more efficient to commute by car than by public transportation. In the *low car efficiency* condition, it was stressed that over the past decade there had been a substantial increase in car traffic on their route. Traffic jams were said to be quite likely, which would increase the travel time by car to as much as 70 min, making this option, on average, relatively less efficient than public transportation.

Beliefs about pollution. All commuters were given information that the environment would be seriously polluted within a period of 10 years: "Scientists have determined that the hole in the ozone layer has expanded and the earth temperature risen. Moreover, in many locations there are reports of serious smog and acid rain effects that form a threat to the environment and public health." In addition, the *low car pollution* condition read "the contribution of car use on the level of environmental pollution has dropped significantly" and that "cars are hardly responsible for the current pollution problems." Conversely, the

high car pollution condition read "car use contributes heavily to the level of environmental pollution." Moreover, in both conditions it was stressed that the use of public transportation would hardly damage the environment.

Commuters were asked to indicate their preferences for commuting by car or public transportation on a 7-point scale, ranging from 1 (*strong preference for car*) to 7 (*strong preference for train*).

Results and Discussion

We performed a 2 × 2 × 2 × 2 (Social Value Orientation: Prosocials vs. Proselfs × Trust: High vs. Low × Car Efficiency: High vs. Low × Car Pollution: High vs. Low) ANOVA on preferences for car versus public transportation. Consistent with Hypothesis 1a, this analysis revealed a main effect for efficiency, $F(1, 116) = 20.29, p < .001$, indicating greater preferences for public transportation when cars were believed to be relatively less efficient ($M = 5.98$, $SD = 1.49$) rather than relatively more efficient than public transportation ($M = 4.55$, $SD = 2.24$). More importantly, a significant interaction between social value orientation and efficiency, $F(1, 116) = 3.94, p < .05$, revealed that the effect of efficiency was more pronounced among proselfs (Ms = 3.77 vs. 6.13, SDs = 2.14 and 1.19; a mean difference of 2.36) than among prosocials (M = 4.88 vs. 5.93, SDs = 2.22 and 1.59; a mean difference of 1.05). Thus, consistent with Hypothesis 1b, the relationship between perceived efficiency (i.e., variations in personal well-being) and preferences for collectively desirable commuting options was stronger for proselfs than for prosocials (Figure 1).

Consistent with Hypothesis 2a, this analysis revealed a main effect for pollution, $F(1, 116) = 4.79, p < .05$, indicating greater preferences for public transportation when cars were believed to be more heavily (vs. mildly) polluting to the environment (Ms = 5.62 vs. 4.85; respective SDs = 1.79 and 2.21). However, contrary to Hypothesis 2b, the analysis did not reveal an interaction of social value orientation and pollution, $F(1, 116) < 1$, *ns*. The relationship between perceived pollution of the environment and preferences for collectively desirable commuting options was not stronger for prosocials than for proselfs.

In support of Hypothesis 3, the analysis revealed a significant interaction of social value and trust, $F(1, 116) = 4.12, p < .05$. Using planned comparisons, we compared prosocials with high trust to the three other groups. Consistent with Hypothesis 3, this contrast was significant, $F(1, 124) = 12.30, p < .001$, revealing that prosocials with high trust exhibited a greater preference for public transportation ($M = 5.98$, $SD = 1.54$) than the other three groups combined ($M = 4.72$, $SD = 1.37$). Moreover, subsequent pairwise comparisons revealed that prosocials with high trust exhibited significantly greater preferences for public transportation than either prosocials with low trust, proselfs with high trust, or

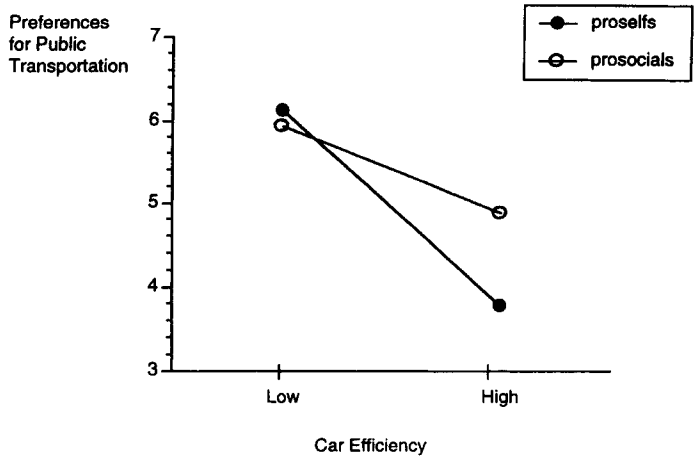

Figure 1. Preferences for public transportation as a function of social value orientation and perceived efficiency of commuting by car (vs. public transportation).

proselfs with low trust (*M*s = 4.72, 5.10, and 4.29, respectively; *SD*s = 2.26, 2.06, and 2.47, respectively; all *p*s < .05), whereas the latter three groups did not significantly differ in their preferences for public transportation. Thus, these analyses provide good support for Hypothesis 3.[4]

We also predicted main effects for both social value orientation (i.e., Hypothesis 4a) and trust (i.e., Hypothesis 4b). The main effect of social value orientation was not statistically significant, $F(1, 116) = 2.36$, $p = .13$, although the means pointed in the predicted direction, with prosocials ($M = 5.37$, $SD = 2.01$) exhibiting a greater preference for commuting by public transportation than proselfs ($M = 4.73$, $SD = 2.14$). Consistent with Hypothesis 4b, we observed a significant main effect for trust, $F(1, 116) = 5.13$, $p < .05$, revealing that individuals with high trust exhibited a greater preference for commuting with public transportation ($M = 5.55$, $SD = 1.95$) than did individuals with low trust ($M = 4.83$, $SD = 2.12$).[5]

[4]It is appropriate to note that the cell sizes differ due to a greater number of prosocials, relative to proselfs. However, all cell means relevant to the two-way interactions involving social value orientation (i.e., their predicted two-way interactions with efficiency, pollution, and trust) are based on at least 14 participants, indicating sufficient levels of statistical power for testing these effects.

[5]While not relevant to our hypotheses, the analysis also revealed a significant interaction of efficiency and pollution, $F(1, 116) = 8.84$, $p < .01$, indicating that preferences for public transportation tended to increase substantially when either (a) cars were believed to be not so efficient, or (b) cars were believed to be highly polluting. Accordingly, preferences for public transportation were lower in the low-efficiency, high-pollution condition ($M = 3.83$) than in any of the other three conditions (*M*s varied from 5.52 to 6.13 and were not significantly different).

Study 2

Study 1 provided good support for two (of three) central hypotheses, each of which predicted interactions of social value orientations. First, consistent with Hypothesis 1b, results revealed for prosocials a stronger relationship between perceived efficiency (i.e., variations in personal well-being) and preferences for collectively desirable commuting options than for prosocials. Second, we failed to find support for Hypothesis 2b, the prediction that the relationship between perceived pollution of the environment and preferences for collectively desirable commuting options would be stronger for prosocials than for proselfs. Third, consistent with Hypothesis 3, prosocials with high trust exhibited greater cooperation than did prosocials with low trust, proselfs with high trust, or proselfs with low trust.

Study 2 was designed to extend and complement Study 1 in at least two ways. First, Study 2 focused on preferences regarding commuting alone by car and carpooling, thereby seeking to examine the generality of the findings of Study 1 across two collectively desirable commuting options—public transportation and carpooling. Second, Study 1 employed scenarios to study commuting preferences, a methodology that is not without limitations. For example, it is not clear whether individuals can effectively "place themselves" in hypothetical situations, and it is questionable whether participants' descriptions of what "they think they might do" corresponds to how they actually behave (e.g., Cooper, 1976).

Study 2 focuses on the actual commuting situation that participants currently experience, thereby employing a correlational approach. That is, we examine the association between social value orientation and (a) preexisting beliefs regarding the relative efficiency of individual car use, and (b) preexisting beliefs regarding the amount of pollution due to car use.

Method

Participants. Participants were 201 individuals who commute by car on a daily basis (179 men and 22 women; 37 years old, on average). The large majority predominantly commute by car (86%), and a few occasionally commute by carpool (14%). The vast majority of people (72%) had full-time employment (i.e., 5 days a week) and a steady work schedule (65%). Their average reported travel time to work is approximately 53 min ($SD = 29.04$).

Procedure. Commuters in Study 2 were recruited during morning and evening rush hour at gas stations along two major highways in the Netherlands (referred to as A1 and A2), one near the city of Amsterdam and the other near the city of Den Bosch. The recruitment procedure was identical to Study 1. Participants

who agreed to participate filled out their names and addresses, and received a survey by mail including a stamped, self-addressed return envelope. In total, 600 surveys were distributed, of which 201 were returned, yielding an overall response rate of 33.5%. About 2 weeks later, participants were debriefed, thanked for their assistance, and sent two small gifts (i.e., a map of the Netherlands and a highlighter). Participation in Study 2 was anonymous, just as in Study 1. The research material included a separate sheet of paper on which participants could fill out their names and addresses if they were interested in receiving a small gift. The instructions explained that the sheet containing their names and addresses was not going to be linked to their responses to the questions in the survey.

Personality questionnaires. As in Study 1, the survey first measured people's social value orientation by using a series of decomposed games. However, rather than nine decomposed games, we adopted a short list of six decomposed games to reduce the length of the questionnaire (for details regarding validity of this six-item measure, see Van Lange, Otten, et al., 1997). Commuters were classified if at least five of six decisions were consistent with either a cooperative, individualistic, or competitive orientation. Following these classification criteria, we identified 118 prosocials (59%), 56 individualists (28%), and 7 competitors (4%); 20 individuals (10%) could not be classified (i.e., this distribution is similar to that of Study 1). As in Study 1, participants with individualistic and competitive orientations were combined into a group of proselfs.

Next, the questionnaire assessed general trust, using the same five items as in Study 1. The internal consistency was lower than ideal ($\alpha = .51$), but was judged to be acceptable in light of the fact that trust is a rather multifaceted concept (i.e., the items measure different contexts in which different levels of trust can be revealed; see also Yamagishi & Sato, 1986). Moreover, all five items were used in Study 1, and the internal consistency could not be enhanced by dropping one or two items. Thus, we retained all five items.[6] As in Study 1, individuals with high versus low trust were identified by means of a median split (median was 4.17), and we found no significant association between social value orientation and trust, $\chi^2(1, N = 180) = 1$. The distributions of prosocials and proselfs were similar among high-trust individuals (respective percentages were 67% and 33%) and low-trust individuals (63% vs. 37%).

[6]Although Yamagishi's (1988) trust scale has yielded robust effects in the context of social dilemmas (e.g., affecting contributions to sanctioning systems; Yamagishi, 1992), the trust scale has not consistently yielded high levels of internal consistency (e.g., Joireman et al., 1997). Accordingly, it would seem desirable to conduct research in which trust is assessed by a greater number of items so as to enhance the internal consistency of the scale for general trust.

Next, we measured ratings of car efficiency, car pollution, and preferences for commuting by car versus carpooling. Each of these constructs was measured with a single item. Beliefs regarding car efficiency (vs. carpooling) were measured by asking "What do you think is more time efficient for you in your commuting situation, driving alone or by carpool?" 1 (*driving alone*), 4 (*indifferent*), 7 (*carpooling*).[7] Beliefs regarding car pollution (i.e., relative contribution of cars to environmental pollution) were measured by asking "In my opinion, cars contribute heavily to the level of environmental pollution," 1 (*very strongly disagree*), 4 (*not agree/disagree*), 7 (*very strongly agree*). Preferences for commuting by car alone or by carpool were assessed by asking "Do you prefer to commute by car alone or carpool in your commuting situation?" 1 (*strong preference for driving alone*), 4 (*indifferent*), 7 (*strong preference for carpooling*).

Results and Discussion

Commuting preferences were analyzed in a 2 × 2 × 2 × 2 (Social Value Orientation: Prosocials vs. Proselfs × Trust: High vs. Low × Car Efficiency: High vs. Low × Car Pollution: High vs. Low) ANOVA. The last two factors were based on median splits.[8] The median for efficiency was 3.50, with high-efficiency beliefs having scores higher than 3.50 and low-efficiency beliefs having scores lower than 3.50. In parallel manner, the median (4.00) was employed to distinguish between high- versus low-pollution beliefs.

Consistent with Hypothesis 1a, a significant main effect for efficiency, $F(1, 165) = 4.32, p < .05$, revealed greater carpool preferences for those believing that carpooling was relatively efficient ($M = 2.99$, $SD = 1.93$) versus those

[7]This question may seem a bit odd, given that driving alone is usually a more efficient option than carpooling (e.g., one does not have to pick up or wait for other people). However, on one of the routes where we recruited our commuters, a separate lane for carpoolers was available. Therefore, carpooling was, at least for some, quite efficient compared to driving by car alone (i.e., the regular lanes were often congested).

[8]Of course, the current data could also be analyzed by a regression analysis, in which carpool preferences are regressed onto the main and interaction effects involving social value orientation, trust, perceived efficiency, and perceived pollution, in which the latter two (or even three) variables are included as continuous variables (e.g., Aiken & West, 1991). However, such regression analyses are not ideal, in that ratings of pollution, and ratings of efficiency in particular, deviated from a normal distribution. In fact, both of these ratings reflected a bimodal distribution. For example, for ratings of efficiency, most participants believed either that commuting by car alone is far more efficient than carpooling (1) or that commuting by carpooling is far more efficient than commuting by car alone (7). Moreover, it is important to note that beliefs regarding efficiency and environmental pollution due to car use (vs. carpooling) were not significantly associated with social value orientation, trust, or their interaction. Hence, we dichotomized the ratings and analyzed them using an ANOVA.

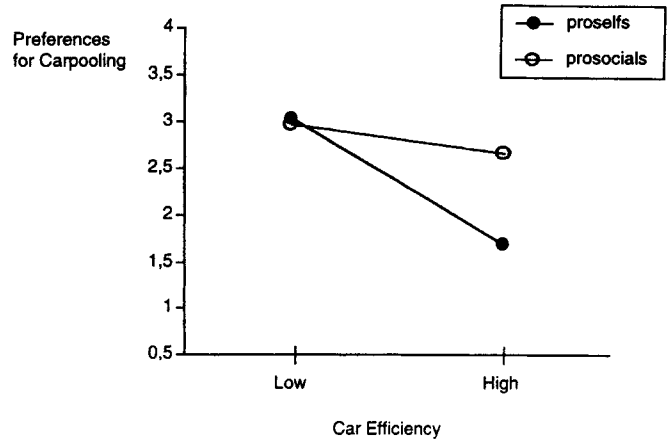

Figure 2. Preference for carpooling as a function of social value orientation and perceived efficiency of commuting by car (vs. carpooling).

believing that carpooling was relatively inefficient ($M = 2.31$, $SD = 1.97$). More importantly, and consistent with Hypothesis 1b, a significant interaction of social value orientation and efficiency, $F(1, 165) = 4.72, p < .05$, revealed that the relationship between efficiency and carpool preferences was significant among proselfs (Ms = 1.69 vs. 3.03, SDs = 1.31 and 1.58; a mean difference of 1.34), $t(62) = 3.69, p < .001$. In contrast, among prosocials, the relationship between efficiency and carpool preferences was less pronounced and not significant (more vs. less efficient: Ms = 2.66 vs. 2.97, SDs = 2.01 and 2.07, a mean difference of 0.31). Indeed, this relationship was not significant, $t(117) = 1$. Thus, consistent with Hypothesis 1b, the relationship between perceived efficiency (i.e., variations in personal well-being) and preferences for carpooling was stronger for proselfs than for prosocials (Figure 2).

Relevant to Hypothesis 2a, a main effect for pollution, $F(1, 165) = 5.33, p < .05$, revealed that carpool preferences were stronger when commuters believed that cars were more strongly (vs. mildly) polluting (Ms = 3.09 vs. 2.26, SDs = 1.94 and 1.82). However, as in Study 1, we did not find an interaction of social value orientation and pollution, $F(1,165) = 0.47$, *ns*. Thus, the relationship between perceived pollution of the environment and preferences for carpooling was not stronger for prosocials than for proselfs (i.e., no evidence in support of Hypothesis 2b).

Relevant to Hypothesis 3, the analysis revealed an interaction of social value orientation and trust, $F(1, 165) = 4.51, p < .05$. Planned comparisons revealed that prosocials with high trust ($M = 3.41$, $SD = 1.50$) exhibited greater

preferences for carpooling than did the other three groups (the mean preference for these three groups was $M = 2.32$, $SD = 1.64$), $t(180) = 3.74$, $p < .001$. Moreover, specific pairwise comparisons revealed that carpool preferences among prosocials with high trust were significantly greater than among low-trust prosocials ($M = 2.22$, $SD = 1.55$), high-trust proselfs ($M = 2.34$, $SD = 1.72$), and low-trust proselfs ($M = 2.35$, $SD = 2.21$; all $ps < .05$). None of these latter three groups differed significantly in carpool preferences.

We also predicted main effects of social value orientation and trust. First, relevant to Hypothesis 4a, the analysis did not reveal a significant main effect for social value orientation, $F(1, 165) = 1.87$, *ns*, although the means were in the predicted direction: prosocial commuters ($M = 2.81$, $SD = 1.64$) and proself commuters ($M = 2.35$, $SD = 2.18$). Second, the main effect for trust (Hypothesis 4b) was significant, $F(1, 165) = 5.19$, $p < .05$, revealing that individuals with high trust ($M = 3.06$, $SD = 1.59$) exhibited somewhat greater carpool preferences than did individuals with low trust ($M = 2.27$, $SD = 2.04$).

Finally, results revealed a significant three-way interaction of social value orientation, trust, and efficiency, $F(1, 165) = 3.94$, $p < .05$. It appeared that the relationship between car efficiency and preferences for carpooling was less pronounced among prosocials with high trust (Ms = 3.26 vs. 3.57, SDs = 2.21 and 2.36; a mean difference of 0.31) than among the remaining three groups—for prosocials with low trust (Ms = 2.66 vs. 1.80, SDs = 1.86 and 1.32; a mean difference of 0.86), proselfs with low trust (Ms = 2.93 vs. 1.95, SDs = 1.21 and 1.57; a mean difference of 0.98), and proselfs with high trust (Ms = 3.12 vs. 1.25, SDs = 1.87 and 1.45; a mean difference of 1.87).

General Discussion

The current research advanced a social dilemma analysis of commuting, examining the roles of social value orientation and trust in determining preferences for collectively desirable commuting options: preferences for commuting by public transportation (Study 1) and carpooling (Study 2). Both studies provided good support for two (of three) central hypotheses, each of which predicted interactions of social value orientations. First, consistent with Hypothesis 1b, results revealed for proselfs a stronger relationship between perceived efficiency (i.e., variations in personal well-being) and preferences for collectively desirable commuting options than for prosocials. However, we failed to find support for Hypothesis 2b, the prediction that the relationship between perceived pollution of the environment and preferences for collectively desirable commuting options would be stronger for prosocials than for proselfs. Finally, consistent with Hypothesis 3, prosocials with high trust exhibited greater cooperation than prosocials with low trust, proselfs with high

trust, or proselfs with low trust. In the following paragraphs, we will briefly consider the broader implications of these findings, discuss some additional findings, and outline some strengths and limitations of the present research.

One important contribution of this research derives from the finding that the link between perceived efficiency of commuting by car and preferences for collectively desirable commuting options were more pronounced among proselfs than among prosocials. Stated somewhat differently, when commuting by car was believed to be relatively costly to self (i.e., in terms of time), commuters with a proself orientation exhibited preferences for public transportation and carpooling that are similar to those of prosocials. Yet, when commuting by car was believed to be not so costly to self, proselfs tended to exhibit strong preferences for commuting by car. These findings are congruent with our claim that, relative to prosocials, individuals with proself orientations tend to be particularly responsive to those aspects of commuting that are relevant to their personal well-being.

It is interesting to relate these findings to extant theories and insights of cooperation in social dilemmas, particularly those suggesting that people are unlikely to cooperate if there are no selfish reasons for doing so. Perhaps Hardin's (1977) well-known piece of advice best illustrates the assumption that self-interest is the primary (if not exclusive) reason for behavior in social dilemmas: "Never ask a person to act against his own self-interest" (p. 27). The current findings are not inconsistent with this assumption, yet indicate that concern with personal well-being would seem to be a more important ingredient in the preferences of proselfs than in the preferences of prosocials. At the same time, we should note that the current research has focused on a particular form of self-interested preference (i.e., time-related costs in a commuting context). In this regard, it is interesting that similar findings have been observed in the context of solving interdependence problems in ongoing close relationships. Specifically, willingness to sacrifice among proselfs has been found to be more strongly associated with considerations of long-term personal well-being than willingness to sacrifice among prosocials (Van Lange, Agnew, et al., 1997). Hence, this finding, too, is consistent with the notion that a concern with personal well-being is a relatively more important ingredient in the preferences and behaviors of proselfs.

The current research did not reveal evidence in support of Hypothesis 2b, the prediction that the relationship between perceived pollution of the environment and preferences for collectively desirable commuting options would be stronger for prosocials than for proselfs. How do we account for this lack of support? One post-hoc interpretation suggests that a concern for environmental pollution is mediated by cooperative motives as well as by concerns of long-term personal well-being (e.g., motives gleaning from personal health) or a concern with the well-being of future generations to which the self is closely

linked (e.g., the well-being of my children). Another interpretation derives from the general notion that personality differences tend to be more pronounced as the situational norms and demands are weaker (e.g., Snyder & Ickes, 1985). It could be that differences underlying prosocials and proselfs are to some extent overshadowed by powerful social norms dictating the appropriateness and moral correctness of commuting by public transportation or carpooling. For example, the instructions employed in Study 1 contained information about environmental pollution which may increase participants' awareness of pollution (e.g., the extent to which this is a serious societal problem, or the extent to which social norms dictate environmentally friendly behavior), which in turn may account for the strong relationship between perceived pollution to the environment and preferences for collectively desirable commuting options among all or most participants.

A third major hypothesis underlying the current research was that prosocials with high trust would exhibit greater preferences for public transportation and carpooling relative to prosocials with low trust, proselfs with high trust, and proselfs with low trust. Both studies supported this hypothesis, providing evidence in support of the claim that two conditions must be met to obtain collective desirable commuting preferences: (a) holding a prosocial orientation, and (b) having relatively high levels of trust in others' cooperation. These findings are congruent with Pruitt and Kimmel's (1977) goal/expectation theory, a theory that has been tested primarily in the context of two-person, experimentally created social dilemmas. As such, the current research helps to extend the social dilemma literature by demonstrating the relevance of this theory in an *n*-person, real-world setting. Moreover, these findings are congruent with Samuelson's (1990) claim that beliefs in others' cooperative intentions can be an important factor in promoting collectively desirable behavior in the context of another important social dilemma—energy conservation.

It is interesting to relate the present findings to prior work on prosocial behavior, which has revealed that the associations between differences in personality and prosocial behavior are somewhat modest in magnitude and somewhat inconsistently observed (cf. Knight, Johnson, Carlo, & Eisenberg, 1994; Staub, 1978). The current findings are congruent with this conclusion, in that preferences for collectively desirable commuting options were not strongly linked with social value orientation and trust (i.e., Studies 1 and 2 did not reveal a significant main effect for social value orientation; only Study 1 revealed a significant main effect for trust). However, researchers of prosocial behavior (e.g., Knight et al., 1994; Staub, 1978) have advanced multiplicative (rather than additive) models of personality, suggesting the importance of combining multiple dispositional variables in accounting for prosocial behavior. The current findings underscore this multiplicative model of personality in the context

of social dilemma, suggesting the importance and validity of the combined role of both (a) differences in goals (i.e., social value orientation), and (b) beliefs regarding others' motivations and behaviors (i.e., trust).

Another possible reason why the link between personality and prosocial behavior might be somewhat weak is that such dispositions are not necessarily linked with prosocial behavior, but with the motivations underlying prosocial behavior. Indeed, the current findings suggest that prosocials *and* proselfs are quite prepared to hold seemingly cooperative preferences, but do so for different reasons. Preferences of proselfs are more strongly guided by a concern of personal well-being than those of prosocials. Indeed, one of the major advantages of an interactionistic approach (Person × Situation approach) is that it helps identify the conditions under which individuals with different personalities behave differently versus similarly (cf. Bem & Allen, 1974; Kenrick & Funder, 1988; Mischel, 1968). The current findings suggest that differences between prosocials and proselfs are likely to be most pronounced in social dilemmas or related situations in which cooperative behavior can hardly be motivated by a concern with personal well-being (e.g., dilemmas in which cooperation can hardly be motivated by efficiency or other considerations of personal well-being, such as anonymous donations to the establishment or maintenance of a public good).

The present findings may have important real-world implications. Past public campaigns stressing the importance of behaving in a societally beneficial manner have not been terribly effective at increasing the use of alternatives to the car (e.g., Baerwald, 1985; Kostyniuk, 1982). The current results suggest that some people may be more likely to respond to such campaigns (e.g., individuals with prosocial orientations), if the campaigns concurrently attempt to bolster the public's trust that other commuters will also make a contribution. And, how could one promote collectively desirable preferences and behavior among individuals with proself orientations? In light of the current findings (i.e., support of Hypothesis 1b), it would be important to design campaigns that emphasize how collectively desirable behaviors may also promote one's personal well-being. That is, such campaigns may require an additional emphasis on the personal benefits associated with commuting by public transportation or carpooling or the personal costs associated with commuting by car. In a similar manner, cooperation among proselfs, in particular, may be promoted by structural solutions to social dilemmas aimed at (a) enhancing personal costs associated with the noncooperative option (e.g., providing no additional parking space to reduce the attractiveness of commuting by car), or (b) enhancing personal benefits associated with the cooperative option (e.g., enhancing comfort in trains).

Before closing, we should consider some of the limitations of this research. A first limitation concerns the relatively large proportion of people

with prosocial orientations in our samples. This might reflect a self-selection bias, because people with prosocial orientations are generally more willing to participate as research volunteers than are people with proself orientations (cf. McClintock & Allison, 1989). A second limitation concerns the fact that our studies examined individuals' preferences for commuting options rather than their actual decisions. Indeed, the association between preferences—as assessed in this research—and actual behaviors in real life is unlikely to be perfect (cf. Cooper, 1976; Freedman, 1972). In light of these limitations, it is noteworthy that the two central findings (i.e., interactions between social value orientation and efficiency, and interaction between social value orientation and trust) were observed in two independent studies that differed in terms of methodology (i.e., a scenario vs. questionnaire study; or manipulated vs. ratings of efficiency) and the nature of cooperation (i.e., preferences for public transportation and carpooling). Nevertheless, we believe that more research is needed to examine real-world social dilemmas with a stronger emphasis on actual behavior (cf. Stern & Oskamp, 1987). For example, it would be useful to conduct quasi-experimental field research that evaluates various interventions (e.g., public campaigns, measures aimed at decreasing costs of public transportation or increasing costs of car use) in terms of their impact on actual commuting behavior. Moreover, it would be fruitful to design laboratory studies that seek to simulate important real-life social dilemmas to examine the relative effectiveness of various interventions on actual choices (i.e., such research would complement prior experimental research on resource dilemmas; e.g., Jerdee & Rosen, 1974; Samuelson, Messick, Rutte, & Wilke, 1984).

One of the most important contributions of the present research is that insights and theories developed in the context of experimentally created social dilemmas are important to understanding cooperation in a large-scale social dilemma in the real world. A social dilemma analysis complements other approaches (e.g., attitudes approaches; Eagly & Chaiken, 1993; Fishbein & Ajzen, 1975) by distinguishing between motivations centering on personal well-being versus collective well-being, and emphasizing the role of trust in others' willingness to make a contribution to collective well-being. Indeed, two social dispositions (i.e., social value orientation and trust) which, at least in part, are rooted in classic research on two-person experimental games, have been found to be important in understanding preferences in one of the most critical social dilemmas in the real world.

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